FACULTY OF PHARMACY

STUDY PROGRAM 0916.1 PHARMACY

CHAIR OF DRUG TECHNOLOGY

APPROVED
at the meeting of the Commission for Quality Assurance and Evaluation of the Curriculum in Pharmacy
Minutes No.2 of 09.11.2021
Chairman, PhD, Associate Professor of Pharmacy
Uncu Livia_____

APPROVED
at the Council meeting of the Faculty of Pharmacy
Minutes No.3 of 16.12.2021
Dean of Faculty, PhD, Associate Professor of Pharmacy
Ciobanu Nicolae_____

APPROVED
approved at the meeting of the chair Drug Technology
Minutes No.1 of 25.08.2021
Head of chair, PhD, Associate Professor of Pharmacy
Ciobanu Nicolae_____

SYLLABUS

DISCIPLINE **MAGISTRAL PHARMACEUTICAL TECHNOLOGY**

Integrated studies / Cycle I, License

Tipe of course: **Compulsory**

Syllabus developed by the team of authors:

Guranda Diana, PhD, associate professor of Pharmacy
Polișciuc Tamara, PhD, associate professor of Pharmacy

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I. INTRODUCTION

General presentation of the discipline: place and role of the discipline in the formation of the specific competences of the professional / specialty training program

The main course in Pharmaceutical Technology is an important component in the field of pharmacy and aims to prepare the drug forms at the pharmacy level, having as a criterion for presenting the degree of dispersion of drug substances in the pharmaceutical form.

The course content is structured and based on long-established preparation techniques, but also brings new conceptual elements of modern pharmaceutical technology, transposed into preparation rules whose ultimate goal is to ensure the quality of the drug, according to current rules.

Mission of the curriculum (aim) in professional training

Creating the theoretical basis of the process of accumulating skills and practical skills of drug preparation by the student in pharmacy. The essential purpose of the pharmacist is to prepare a correctly dosed, chemically, physically and microbiologically stable dosed drug for storage, which is therapeutically active and acceptable for administration.

Languages of the discipline: Romanian, English ;

Beneficiaries: students of the 5 year, faculty of Pharmacy.

II. MANAGEMENT OF THE DISCIPLINE

Code of discipline		**S.05.O.041, S.06.O.047**	
Name of the discipline		**Magistral pharmaceutical technology**	
Person(s) in charge of the discipline		**Guranda Diana,** PhD, associate professor of Pharmacy	
Year	**III**	Semester/Semesters	**V, VI**
Total number of hours, including: 300			
Lectures	**30**	Practical/laboratory hours	**105**
Seminars	**-**	Self-training	**165**
Form of assessment	**E**	Number of credits	**10**

III. TRAINING AIMS WITHIN THE DISCIPLINE

At the end of the discipline study the student will be able to:

- ***at the level of knowledge and understanding:***

- To determine the objectives and content of the main pharmaceutical technology;
- To determine the object of study of the discipline;
- To define the concepts of the main pharmaceutical technology and their evaluation according to the requirements of the Analytical Standardization Documentation (ASD);
- To correctly interpret the technological operations at different stages of preparation of the pharmaceutical forms according to the medical prescriptions and the order forms;
- To identify the main physico-chemical and technological parameters of medicinal substances, auxiliary substances, adjuvants and packaging materials, which determine the quality of the prepared medicine;
- To know the rules of good practice for the manufacture of medicines in pharmacy conditions;
- To describe the technological processes for the preparation of medicinal forms and the pharmaceutical equipment frequently used in the production sections of pharmacies;
- To know the physico-chemical properties of medicinal substances, auxiliary substances, adjuvants and packaging materials;

- ***at the application level:***

- To identify the particularities of the application of technological operations in the preparation of main pharmaceutical forms;
- To classify the principles of preparation of different main pharmaceutical forms according to the biopharmaceutical requirements;
- To explain the essence of the principles of selection of the physico-chemical properties of the auxiliary substances and of the packaging material in the process of preparation, packaging and release of the main medicinal forms;
- To compare the practical experience and the doctrine of pharmaceutical technology at various stages of the evolution in the preformulation and formulation of medicines;
- To interpret the quality norms of the drugs imposed by the pharmacopoeia and the reference standards;
- To carry out in pharmacy conditions the preparation of different types of pharmaceutical forms according to the stages of the technological process;

- ***at the integration level:***

- To create new technological procedures for optimizing the preparation of main pharmaceutical forms;
- Modify existing drug preparation technologies to reduce costs;
- To validate the stages of the drug preparation technology process and quality control methods;
- To evaluate the influence of different factors on the quality of the main pharmaceutical forms;
- To recommend new auxiliary substances and adjuvants necessary in the preparation of main pharmaceutical forms;
- To develop technological prescriptions for the preparation of pharmaceutical elaborations at the pharmacy level;
- To propose new methods for evaluating the quality of the main medicinal forms;
- To select the appropriate packaging materials for the packaging of pharmaceutical forms;

- To deliver to the consumers correctly, qualitatively and explicitly the prepared pharmaceutical form.

IV. PROVISIONAL TERMS AND CONDITIONS

Drug technology addresses in detail a wide range of issues related to the study of preformulation, formulation and bioavailability of drugs; study of specific operations and technological processes used in the preparation of drugs, the degree of dispersion of the drug substance in the pharmaceutical product; route of administration; type of preparation; the nature of the vehicle; quality control of the following categories of pharmaceutical preparations: solid pharmaceutical forms, drug solutions, colloidal solutions, suspensions, emulsions, ophthalmic and parenteral forms, also presenting the provisions and general considerations of the pharmaceutical form approached, as well as particularities related to their stability.

V. THEMES AND ESTIMATE ALLOCATION OF HOURS

Lectures, practical hours/ laboratory hours/seminars and self-training

No. d/o	THEME	Number of hours		
		Lectures	Practical hours	Self-training
1.	Technology of medicinal forms as a science. Basics and pharmaceutical terminology. State standardization in the production of medicines. Classification of medicinal forms. Assortment of main pharmaceutical forms. Toxic and highly active substances. General notions of biopharmacy.	2	3	5
2.	Solid pharmaceutical forms. Medicinal powders. General rules for the preparation of composite powders which differ in the prescribed quantity, specific gravity and particle structure. Preparation of powders containing hard-to-grind, colored substances, dyes and powders with dry extracts. Technology for the preparation of powders containing toxic and highly active substances. Triturations. Quality control. *Totalization N1.*	4	12	15
3.	Volume dosing in drug technology. Classification of solutions. Peculiarities of preparing solutions. Special cases of preparation of aqueous solutions. Non-aqueous solutions. Alcoholic solutions. Dilution of alcoholic solutions. Technology for the preparation of standard pharmacopoeial solutions. Example.	2	6	10
4.	Concentrated solutions. Preparation. Quality control. Preparation of mixtures with the use of concentrated solutions or with the use of solid medicinal substances. Aromatic waters. Technology of mixtures with aromatic water content. Example. *Totalization N2.*	2	9	10

No. d/o	THEME	Number of hours		
		Lectures	Practical hours	Self-training
5.	Aqueous extractive solutions. Preparation of aqueous extractive solutions (infusions and decoctions) from medicinal plant products and standardized extracts. Quality control.	2	6	15
6.	Macromolecular Substances Solutions (MSS). Example. Colloidal solutions. Technology for the preparation of colloidal solutions. Quality control. *Totalization N3.*	2	6	10
7.	Practical skills		3	
8.	Pharmaceutical suspensions. Preparation methods. Characteristic of stabilizers. Technology of suspensions from hydrophilic substances and hydrophobic substances with a weak and strong character. Example. Quality control.	2	8	10
9.	Pharmaceutical emulsions. Preparation methods. Natural and artificial emulsion technology. Characteristic of emulsifiers. Peculiarities of benzyl benzoate emulsion preparation. Quality control. *Totalization N4.*	2	12	10
10.	Semi-solid medicinal forms. Ointment. Rules for the incorporation of medicinal substances into the ointment base. Ointments - solutions and ointments - suspensions. Technology for the preparation of emulsion ointments and polyphasic ointments. Example. Quality control.	2	8	15
11.	Suppositories. The excipients. Rules for the incorporation of medicinal substances into suppositories. Preparation of suppositories by manual modeling method and melting and molding method. The stages of the technological process and the particularities of the preparation. *Totalization N5.*	2	12	15
12.	Medicinal forms that require preparation in aseptic conditions. Classification. Requirements. Aseptic block characteristic. Injectable solutions. Preparation of injectable solutions consisting of salts of strong acids and weak bases, weak acids and strong bases. Characteristic of stabilizers. Quality control.2.	2	4	10
13.	Technology of injectable solutions with strong oxidants. Particularities of the preparation. Characteristic of antioxidants. Infusion technology. Requirements. Isotonization. Quality control.	2	4	10
14.	Ophthalmic pharmaceutical forms. Characteristic. Requirements. Ophthalmic drop technology with the use of solid drugs and concentrated solutions. Quality control. Ophthalmic ointment. Peculiarities of preparation technology. Example.	2	4	10

No. d/o	THEME	Number of hours		
		Lectures	Practical hours	Self-training
	Totalization N6.			
15.	Pharmaceutical forms with antibiotics. Peculiarities of preparation. Example. Pharmaceutical incompatibilities. Ways to avoid incompatibilities in the main pharmaceutical forms. Example.	2	4	10
16.	Practical skills		4	10
Total		**30**	**105**	**165**

VI. PRACTICAL TOOLS PURCHASED AT THE END OF THE COURSE

Mandatory essential practical tools are:

- To determine the quality of active medicinal substances and excipients used in the preparation of main pharmaceutical forms;
- Abilities in the correct selection of the equipment used in the preparation of the main pharmaceutical forms;
- Knowledge of the composition of main preparations in the pharmacy in the form of solutions, powders, suspensions, emulsions, parenteral and ophthalmic preparations, preparation technology, their conditioning and preservation, as well as the mode of administration, correlated with the therapeutic indication;
- Practical skills in performing calculations to verify the doses of prescription drugs in pharmaceutical forms;
- Knowledge of the cases of occurrence of pharmaceutical incompatibilities in solid and liquid pharmaceutical forms, as well as methods of their avoidance;
- Advise patients on the correct administration of liquid drugs with micro-heterogeneous structures.

Note: The essential practical tools characteristic of the discipline, obligatory to be acquired by each student during the module, will be listed. These will serve as a basis for the stage of evaluating practical skills and will constitute their portfolio per study program.

VII. OBJECTIVES AND CONTENT UNITS

Objective	Content units
Theme (chapter) 1. Technology of master drug forms - as a scientific discipline	
• To define the role of the pharmacist in medicine;	Pharmacy - complex science. Basic directions of pharmacy science - profile

Objective	Content units
• Pharmacist-patient relationship; • To define pharmacy as a science; • To know the basic directions of science - pharmacy; • To have knowledge in the fields of profile disciplines; • Define the role of the pharmacist in the preparation of medicines.	disciplines. Pharmacist - medicine. Pharmacist - his role in medicine. Pharmacist - his role in the preparation of master pharmaceutical forms.
Theme (chapter) 2. Organizing the production process of the main medicinal forms	
• To know and respect the rules of the Sanitary Regime in the pharmaceutical enterprises and institutions; • To know the sanitary requirements to the rooms and equipment; • To assess the sanitary requirements for the clearing of rooms and pharmaceutical equipment; • Know the requirements for personal hygiene of workers.	To get acquainted with the process of preparation of pharmaceutical forms based on the "Vasile Procopișin" University Center. Healthcare in pharmaceutical companies and institutions. General provisions for rooms and equipment. General provisions for personal hygiene of workers.
Theme (chapter) 3. Solid pharmaceutical forms. Medicinal powders	
• To know the characteristic of powders; • Know the methods of prescribing powders; • To define the classification of powders; • Know the basic requirements for powders: - powdery mildew; - homogeneity of the mass; - dosing accuracy; - stability. • To define the stages of the technological process of powder preparation; • To integrate in the preparation process knowledge obtained from other disciplines; • Know the ways to improve the packaging of powders, such as encapsulation in capsules operated with the help of the manual accessory set "Feton"; • To define the appreciation of powders from a biopharmaceutical aspect; • Assess the compatibility of components in compound prescriptions; To argue the capacity of the action in the process of preparation of medicinal powders. compound.	Powder - an ancient pharmaceutical form, which is still relevant today. The correctness of the doctors' fair assessment of the methods of prescribing powders (divided and undivided).
Theme (chapter) 4. Purified water and water for injections	

Objective	Content units
• Know the sanitary rules put forward for the preparation of purified water and water for injections; • Know the rules for transporting purified water to workplaces; • Emphasize the washing and disinfection of dishes needed for bottling water; • Know the necessary substances used in pharmacy for the removal of pyrogenic substances; • Know the storage conditions and shelf life of purified water and water for injections.	Purified water required for the preparation of main medicinal forms. Water for injections needed to prepare sterile forms. The room where the purified water and the water for injections are obtained and stored. Peculiarities of purified water conservation and water for injections.
Theme (chapter) 5. Liquid pharmaceutical forms. Medicinal solutions	
• Know the methods of prescribing solutions; • Know the basic requirements for liquid pharmaceutical forms; • To know how to control the dose for toxic and highly active substances in liquid forms; • To define the stages of the technological process of preparation of medicinal solutions; • To know the peculiarities of preparing aqueous solutions; • To know the peculiarities of preparing solutions with substances that are hardly soluble in cold water.	Solutions - pharmaceutical form, commonly found in local prescriptions. Ensuring the desired concentration of the drug substance. Ensuring the physico-chemical stability of the drug substance. Ensuring clarity.
Theme (chapter) 6. Non-aqueous solution technology. Alcoholic solutions	
To define the characteristic of alcoholic solutions; • To know how to express the concentration of ethyl alcohol; • To know the official alcoholic solutions; • To know the medicinal substances soluble in ethyl alcohol; • To know the peculiarities of mixing water with ethyl alcohol (shrinkage phenomenon); • To know the possibilities of diluting ethyl alcohol; • Possess skills in alcohol preparation technology; • To know the particularities of preparing alcoholic solutions; • Define quality control: -establishing organoleptic characters; -identification and dosing of active principles; -alcohol dosing; -dose of acidity. • To know how to preserve alcoholic solutions.	General aspects. Officinal alcoholic solutions. Master alcoholic solutions. Dilution of alcoholic solutions. Conservation.
Theme (chapter) 7. Technology of semi-solid pharmaceutical forms. Medicated ointment	

Objective	Content units
• To know the characteristics of semi-solid preparations; • To define the classification according to different criteria of soft pharmaceutical forms; • Know the requirements for ointments; • Know the criteria for classifying excipients; • Know the requirements beforehand for excipients used in the preparation of ointments; • Define the formulation of ointments; • To have knowledge related to the peculiarities of preparing ointments; • Appreciate the quality of ointments.	Ointment formulation. Classification of ointments. Ointment bases. Preparation of medicinal ointments. Ointment quality control.
Theme (chapter) 8. Suppositories. Characteristic. Preparation methods	
• To know the characteristic of suppositories; • To define the criteria for classifying suppositories; • Appreciate the requirements of FR X for suppositories; • Be able to perform dose control for active substances in suppositories; • Define the classification and requirements for excipients in suppositories; • To know the methods of preparation of suppositories at the pharmacy level; • To know how to prepare suppositories based on different excipients; • To be able to appreciate the quality control of suppositories from a technological and biopharmaceutical point of view.	Formulation of suppositories. Bases for suppositories. Preparation of suppositories. Packaging and labeling of suppositories. Quality control of suppositories.
Theme (chapter) 9. Ophthalmic pharmaceutical forms. Ophthalmic drops. Ophthalmic ointment	
• To be able to define the types of ophthalmic preparations; • To know how to prepare eye drops; • To know how to incorporate drug substances into eye drops; • To appreciate the quality conditions of the eye drops; • To be able to define the quality control of eye drops after FR X;	Definition of. Types of ophthalmic preparations. Preparation of ophthalmic solutions. Preparation of ophthalmic ointments. Quality conditions. Therapeutic efficacy.
Theme (chapter) 10. Pharmaceutical incompatibilities	
• To define the notion of pharmaceutical incompatibility; • To know the causes that lead to the obtaining of pharmaceutical incompatibilities in the main medicinal forms;	The definition. Types of pharmaceutical incompatibilities. Examples of incompatibilities at the pharmacy level.

Objective	Content units
• To know the criteria for classifying pharmaceutical incompatibilities; • To know the methods of avoiding pharmaceutical incompatibilities in main pharmaceutical forms (powders, solutions, mixtures, colloidal solutions, eye drops, etc.).	Ways to avoid pharmaceutical incompatibilities in the main pharmaceutical forms.

VIII. PROFESSIONAL (SPECIFIC (SC)) AND TRANSVERSAL (TC) COMPETENCES AND STUDY FINALITIES

✓ Professional (specific) (SC) competences

PC1: Knowledge of the theoretical bases of the disciplines included in the faculty curriculum, of the general principles in the elaboration, analysis and registration of pharmaceutical and parapharmaceutical products; knowledge of the general principles of organization and operation of pharmaceutical institutions with different legal forms of activity; knowledge of the legislative framework in the field of pharmacy; knowledge of the rights and obligations of the pharmacist.

PC2: forecasting the basic economic indices of the pharmacy: achievements, stocks of pharmaceutical preparations; travel expenses; benefit; assessing trends in the development of drug care; performing various practical tasks related to the preparation, analysis and standardization of drugs of synthetic origin and phytopreparations; knowledge of the medicine in terms of its action, indications, contraindications, side effects, administration and interactions; implementation of patient counseling and pharmaceutical care in practice.

PC3: designing the practical activity in the pharmaceutical system according to the diversity of professional roles; use and adaptation of theoretical knowledge in the field of pharmacy to the situations of practical activity; streamlining professional activity by introducing innovative elements in the field of pharmaceuticals; application of the requirements of the normative acts in the field of pharmacy in the practical activity; possession of the computer as a working tool in the theoretical and practical pharmaceutical activity; establishing the correlation between the components of the pharmaceutical activity process and the healthcare system of the population; continuous efficiency of the pharmaceutical activity by introducing innovations and implementing inventions in the field.

PC4: diagnosis of the particularities and organizational culture of the institution in the pharmaceutical system, where the specialist carries out his activity; design and coordination of pharmaceutical activity in various institutions: open state or private pharmacies; hospital pharmacies; pharmaceutical warehouses; medicine factories, laboratories for quality control and certification of medicines, etc .; the active involvement of the specialist in the process of accomplishing the mission of the pharmaceutical institution; demonstrating the ability to make decisions aimed at improving the pharmaceutical system.

PC5: determining the criteria for evaluating the effectiveness of the pharmaceutical system and personal activity according to the real conditions and in a concrete social context; determining the ways of directing the pharmaceutical activity based on the evaluation results; identifying research problems in the field of pharmacy; knowledge of the methodology of scientific research in the practical activity of pharmacist or head of the pharmaceutical unit.

PC6: adopting messages to various socio-cultural backgrounds, including by communicating in

several foreign languages; use of problem-solving skills in the pharmaceutical activity through collaboration with doctors; promoting the principles of tolerance and compassion towards patients; the use of information technology (and computer) in the pharmaceutical business;

- ✓ **SPECIFIC COMPETENCES (SC)**

SC1: thorough knowledge and understanding of pharmaceutical terms in drug technology.

SC2: understanding the responsibility and role of the pharmacist-technologist in the drug production process.

SC3: knowledge of the principles of organization of the drug preparation process.

SC4: understanding the importance of complying with the requirements of the health system in pharmacy conditions in order to obtain a quality product.

SC5: understanding the role of the influence of pharmaceutical factors on the quality of biopharmaceutical preparations.

- ✓ **Transversal competences (TC)**

TC1: Promoting logical reasoning, practical applicability, evaluation and self-evaluation in decision making; compliance with the rules of ethics and pharmaceutical ethics in the preparation, analysis, transport and release of medicinal remedies to the population and medical institutions.

TC2: Identifying the training needs according to the evolution of the pharmaceutical system; determining the priorities in the continuous professional training of the pharmacist; appreciation of changes in the pharmaceutical system as a condition of its functionality.

TC3: Carrying out activities and exercising the specific roles of teamwork. Promoting the spirit of initiative, dialogue, cooperation, positive attitude and respect for others, empathy, altruism and continuous improvement of one's activity.

- ✓ **Study finalities**
  - To determine the object of study of the discipline;
  - To define the concepts of mainstream drug technology and their evaluation according to DAN requirements;
  - To correctly interpret the technological operations at different stages of preparation of medicines according to medical prescriptions and purchase orders;
  - To identify the main physico-chemical and technological parameters of medicinal substances, auxiliary substances, adjuvants and packaging materials, which determine the quality of the prepared medicine;
  - To know the rules of good practice for the manufacture of medicines in pharmacy conditions;
  - To describe the processes of the technological stage of preparation of the medicinal forms and the pharmaceutical devices used in the production sections of the pharmacies;
  - To know the physico-chemical properties of medicinal substances, auxiliary substances, adjuvants and packaging materials;
  - To know how to pack, label, form and release the main pharmaceutical forms.

Note. Discipline finatities (are deduced from the professional competences and the formative valences of the informational content of the discipline).

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IX. STUDENT'S SELF-TRAINING

No.	Expected product	Implementation strategies	Assessment criteria	Implementation terms
1.	Working with teaching materials	Systematic work in the library and within the Department. Documentation with current electronic sources on the topic under discussion.	1. The quality of the systematization of the informational material obtained through own activity.	During the semester
2.	Paper and other research papers	Analysis of relevant sources on the topic of the paper. Preparation of papers and other analysis and research papers. Preparation of the report in accordance with the requirements in force and its presentation in the practical work.	1. Additional literature is recommended - the national journal of the Republic of Moldova (Pharmaceutical Journal of Moldova), such as magazines from Romania, Bulgaria, Belarus, etc .; clinical journals to understand the problem. 2. The concordance of the information with the proposed topic.	During the semester
3.	Working with medical prescriptions	Choice and description of the recipe. Analysis of the stages of preparation of the pharmaceutical form. Compilation of the written verification document and presentation of the teacher.	1. Workload. 2. Solving the situation problem (prescription), the correct release of the drug.	During the semester

X. METHODOLOGICAL SUGGESTIONS FOR TEACHING-LEARNING-ASSESSMENT

✓ ***Teaching and learning methods used***

The discipline Pharmaceutical Technology is taught in a classic way: course, practical works, individual work of the student. The course is taught by the course holder. In the practical work the students' activity is individualized, each student, prepares the pharmaceutical form according to the medical prescription, appreciates the quality of the pharmaceutical form prepared according to the pharmacopoeic requirements, interprets the correctness of the technological operations at different stages of preparation of the medicines the main physico-chemical and technological parameters of the medicinal substances, auxiliary substances, adjuvants and

packaging materials, which determine the quality of the prepared medicine. It is necessary to know the rules of good practice for the manufacture of medicines in pharmacy, the description of pharmaceutical processes and devices used in the production departments of pharmacies, knowledge of the physicochemical properties of drugs, auxiliaries, adjuvants and packaging materials, and training the written verification document.

The individual work of the student includes virtual training with the help of CDs and films that briefly reproduce the technology of preparation of pharmaceutical forms, as well as the formation of notebooks where the stages of the technological flow of preparation of the medicinal form are described in by studying the additional literature (the recipes are selected from the main recipe of the University Pharmaceutical Center "Vasile Procopișin").

The chair is equipped with computers (Workstation PC1330 Navigator computer and PC Mini Nettop Seli 3Q Core and BENQ monitor). Computers are connected to the Internet via the Wireless system (Router Model WR941 ND).

- ✓ **Suggestions for individual activity**

The individual work in the learning process includes the study of the additional material for each topic from the basic bibliographic sources and additional from the databases available through the communication networks, the library of the department and the electronic library of USMF "Nicolae Testemitanu".

- ✓ ***Applied*** *(specific to the discipline)* ***teaching strategies / technologies***

Virtual training (CD information, movies)

Nr. o	Denumirea CD-lui, filmului	Minute
	Filme	
	Forme farmaceutice moi	
2.	001.Ung Ointment. Flv.unguente (*video în limba engleză*)	**14,06 minute**
3.	002 Forme farmaceutice semisolide. Unguente(*video în limba rusă)*	**5,32 minute**
4.	003 Forme farmaceutice semisolide. Unguente(*video în limba engleză)*	**5,49 minute**
5.	004 Forme farmaceutice semisolide. Unguente(*video în limba rusă)*	**24,11 minute**
6.	005 Forme farmaceutice semisolide.Supozitoare(*video în limba engleză*)	**9,05 minute**
7.	006 Forme farmaceutice semisolide. Pilule(*video în limba engleză*)	**10,47 minute**
8.	007 Forme farmaceutice preparate in conditii aseptice (*video în limba*	**14,41 minute**

Nr. o	Denumirea CD-lui, filmului	Minute
	engleză)	
9.	008 Forme farmaceutice preparate in conditii aseptice (*video în limba engleză)*	**9,30 minute**
10.	009 Forme farmaceutice preparate in conditii aseptice (*video în limba rusă*)	**4,42 minute**
11.	010 Forme farmaceutice preparate in conditii aseptice (*video în limba rusă*)	**5,32 minute**
	Total	**102 minute**

- ***Methods of assessment*** *(including the method of final mark calculation)*

Current:: Front and individual control by:

- To determine the object of study of the discipline;
- To define the concepts of mainstream drug technology and their evaluation according to the AND requirements;
- To correctly interpret the technological operations at different stages of preparation of medicines according to medical prescriptions and order forms;
- To identify the main physico-chemical and technological parameters of medicinal substances, auxiliary substances, adjuvants and packaging materials, which determine the quality of the prepared medicine;
- To know the rules of good practice of manufacturing medicines in pharmacy conditions;
- To describe the pharmaceutical processes and devices used in the production sections of pharmacies;
- To know the physico-chemical properties of medicinal substances, auxiliary substances, adjuvants and packaging materials;
- Possess skills related to packaging, labeling, packaging and preparation of the pharmaceutical form for release.

During the academic year, students will make 6 -totalizations (tests, situation problems, recipes) and 2 grades for the individual work of the student.

Final*:* The passing **exam** (summative assessment) is a complex one, consisting of a computer-based test, an oral test and practical skills, which will be taken after the autumn semester (winter session) and after the spring semester (summer session).

The test is performed in the computer room, 6 test variants are introduced. 120 minutes are reserved for the student. The test is assessed with marks from 0 to 10.

For the oral test each student receives an examination ticket containing 3 questions (2 theoretical questions, 1 question - recipe). The student has 30 minutes to prepare. The test is assessed with marks from 0 to 10.

The test - practical skills is performed in the laboratory that is prepared for the practical exam, so each student according to the examination ticket that contains a medical prescription (selected from the main recipe of the CFU "Vasile Procopisin") does all the calculations, prepares, packs, prepares and prepares the pharmaceutical form for release. It is evaluated by the examiners according to the evaluation grid.

The final grade consists of 4 components: the average annual grade (coefficient 0.3); computer tests (coefficient 0.2), oral test (coefficient.0.3); practical skills (coef.0,2). The final weighted grade is calculated based on the positive grades (≥5) automatically according to the SIMU program. The annual average grade and the marks of the final examination stages will be expressed in numbers according to the grading scale indicated in the table. The final grade obtained will be expressed in two decimal places, which will be entered in the notebook.

Method of mark rounding at different assessment stages

Intermediate marks scale (annual average, marks from the examination stages)	National Assessment System	ECTS Equivalent
1,00-3,00	**2**	**F**
3,01-4,99	**4**	**FX**
5,00	**5**	**E**
5,01-5,50	**5,5**	
5,51-6,0	**6**	
6,01-6,50	**6,5**	**D**
6,51-7,00	**7**	
7,01-7,50	**7,5**	**C**
7,51-8,00	**8**	
8,01-8,50	**8,5**	**B**
8,51-9,00	**9**	
9,01-9,50	**9,5**	**A**
9,51-10,0	**10**	

The average annual mark and the marks of all stages of final examination (computer assisted, test, oral) - are expressed in numbers according to the mark scale (according to the

table), and the final mark obtained is expressed in number with two decimals, which is transferred to student's record-book.

Absence on examination without good reason is recorded as "absent" and is equivalent to 0 (zero). The student has the right to have two re-examinations in the failed exam.

IV. RECOMMENDED LITERATURE:

A. Compulsory :

1. Eugen Diug, Diana Guranda, Tamara Polișciuc, Rodica Solonari. Tehnologie farmaceutică extemporală. Compendiu. Ed. ,,Universul". Chișinău, 2013.
2. Eugen Diug, Ion Trigubenco. Tehnologia medicamentelor în farmacie. "Universitas", Chişinău, 1992.
3. Diana Guranda. Indicații metodice la lucrările de laborator pentru studenții anului III, facultatea de Farmacie. Chișinău, 2011.
4. S.E.Leucuță, Marcela Achim, Elene Dinte. Prepararea medicamentelor. Îndrumător pentru studenții de la farmacie. Ediția II-a. Editura medicală universitară ,, Iuliu Haţieganu". Cluj- Napoca, 2009.
5. Diana Guranda, Tamara Polișciuc. Emulsii farmaceutice. Indicație metodică pentru studenții de la farmacie. Chișinău, 2017.
6. Diana Guranda, Tamara Polișciuc. Suspensii farmaceutice. Recomandări metodice pentru studenții anului III, facultatea de Farmacie. Chișinău, 2018.

B. Additional

1. European Pharmacopoeia, 7rd ed., Council of Europe, Strasbourg, 2011.
2. Farmacopeea Română, ed.a-X-a, Ed. Medicală, București, 2009.
3. Farmacopeea Română Ediția a X-a, Supliment 2006, Ed. Medicală, București, 2006.
4. Ordinul MS RM nr. 960 din 01.10.2012 ,,Cu privire la modul de prescriere și livrare a medicamentelor".
5. Iuliana Popovici, Dumitru Lupuleasa. Tehnologie farmaceutică (tratat), vol.I.- Ed. a 4-a. Iași, 2017.
6. Iuliana Popovici, Dumitru Lupuleasa. Tehnologie farmaceutică (tratat), vol.II.- Ed. a 2-a . Iași, 2017.
7.Iuliana Popovici, Dumitru Lupuleasa. Tehnologie farmaceutică (tratat), vol.III.- Ed. a 2-a. Iași, 2017.